

CME Interaction with Large-scale Coronal Structures

Nat Gopalswamy
NASA Goddard Space Flight Center,
Greenbelt, MD 20771

This talk presents some key observations that highlight the importance of CME interaction with other large scale structures such as CMEs and coronal holes. Such interactions depend on the phase of the solar cycle: during maximum, CMEs are ejected more frequently, so CME-CME interaction becomes dominant. During the rise phase, the polar coronal holes are strong, so the interaction between polar coronal holes and CMEs is important, which also leads to a possible increase in the number of interplanetary CMEs observed as magnetic clouds. During the declining phase, there are more equatorial coronal holes, so CMEs originating near these coronal holes are easily deflected. CMEs can be deflected toward and away from the Sun-Earth line resulting in interesting geospace consequences. For example, the largest geomagnetic storm of solar cycle 23 was due to a CME that was deflected towards the Sun-earth line from E22. CME deflection away from the Sun-Earth line diminishes the chance of a CME producing a geomagnetic storm. CME interaction in the coronagraphic field of view was first identified using enhanced radio emission, which is an indication of acceleration of low energy (~ 10 keV) electrons in the interaction site. CME interaction, therefore, may also have implications for proton acceleration. For example, solar energetic particle events typically occur with a higher intensity, whenever multiple CMEs occur in quick succession from the same source region. CME deflection may also have implications to the arrival of energetic particles to earth because magnetic connectivity may be changed by the interaction. I illustrate the above points using examples from SOHO, STEREO, Wind, and ACE data.

Work supported by NASA's Living with a Star Program